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10/595,690

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EXAMINER

LARKIN, DANIEL SEAN

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|-----------------------------------|--|
| Office Action Summary | Application No. 10/595,690 | Applicant(s) HUG ET AL. | |
| | Examiner DANIEL S. LARKIN | Art Unit 2856 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 November 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 10-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 23-25 is/are allowed.
- 6) ☒ Claim(s) 10-15, 17-21, 26, and 27 is/are rejected.
- 7) ☒ Claim(s) 16 and 22 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>07/1/2010 & 13/1/2010</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 26 is rejected under 35 U.S.C. 102(b) as being anticipated by US 5,717,132 (Watanabe et al.).

Watanabe et al. disclose a cantilever assembly (Figure 10), comprising: a cantilever (CA1) having a cantilever tip (3P), the cantilever having a back side (top of cantilever) and a front side (bottom side, tip side) opposite the back side and the cantilever being operably mounted to a rigid support (19) on the back side, wherein the cantilever comprises a step-like portion on its front side near where the cantilever is attached to the support, the step-like portion substantially increasing a thickness of the cantilever.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. Claim 10-13, 17, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,245,863 (Kajimura et al.) in view of "Small Cantilevers for Force Spectroscopy of Single Molecules" (Viani et al.).

With respect to the limitations of claims 10-13 and 21, Kajimura et al. disclose an atomic force microscope and method of manufacturing one, comprising: a cantilever assembly for scanning a sample (12), comprised of: a cantilever (16) having a cantilever tip (14), the cantilever being mounted to a rigid support (17) and being provided with an area (18) of high reflectance material on the back side of the cantilever. The area (18) appears to have a boundary sloping towards the support (17) which fulfills the condition the area of the high reflectance material divided by the area of the sloping boundary area is greater than one, see Figure 1. The area of high reflectance is created by a source containing material having a high reflectance. Kajimura et al. fail to disclose a cantilever or an area of high reflectance material of the size claimed.

Viani et al. disclose a process whereby small rectangular cantilevers are fabricated from silicon nitride. Viani et al. disclose that the cantilevers fabricated have a length of 9-50 micrometers and metallic reflector pads have been added to the cantilever ends to maximize reflectivity. Although the article to Viani et al. fails to expressly disclose the size of the reflector pad, the examiner argues that with a cantilever having a length of nine micrometers, naturally, the reflector pad would have an area of reflectance less than ten micrometers. Providing a "small" cantilever would have been obvious to one of ordinary skill in the art because it is well known in the art

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that small cantilevers have higher resonant frequencies than larger cantilevers, while simultaneously providing the same spring constants.

With respect to the limitation of claim 17, Kajimura et al. appear to shown, Figure 1, that the portion of the support (17) to which the cantilever (16) is attached has a recessed shaped which narrows in a direction towards the cantilever.

5. Claim 14, 15 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,245,863 (Kajimura et al.) in view of "Small Cantilevers for Force Spectroscopy of Single Molecules" (Viani et al.) as applied to claim 10 above, and further in view of US 5,319,961 (Matsuyama et al.).

With respect to the limitations of claims 14, 15, and 20, the combination of Kajimura et al. in view of Viani et al. disclose all of the limitations of the base claim, but fail to disclose that the support provided with a sharp edge that is located a distance from a back side of the cantilever tip, the distance being determined such that during application of the reflectance material the area on the back side of the cantilever tip and the sloping boundary are formed on a support having at least two steps and wherein the edge of the second step does not obstruct application of the high reflectance material.

Matsuyama et al. disclose a cantilever chip for use in scanning probe microscopes, comprising: a cantilever (16) attached to a substrate (12). In one embodiment, as shown in Figure 2J, the substrate (12) is provided with a sharp edge having at least two steps that is located a distance from a back side of the cantilever tip. The arrangement of the support would appear to allow formation of a reflectance

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material on the back side of the cantilever above the cantilever tip. Providing a substrate having a sharp edge would have been obvious to one of ordinary skill in the art as a means of properly adhering the cantilever to the support.

6. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,245,863 (Kajimura et al.) in view of "Small Cantilevers for Force Spectroscopy of Single Molecules" (Viani et al.) as applied to claim 10 above, and further in view of US 5,753,912 (Matsuyama).

With respect to the limitation of claim 18, the combination of Kajimura et al. in view of Viani et al. disclose all of the limitations of the base claim, but fail to disclose that the recessed part of the support is partly-octagonal.

Matsuyama discloses a cantilever chip comprising a support section (4) for supporting a cantilever (6). The support section has a recessed portion (16) narrowing in the direction towards the cantilever. Additionally, in an alternative embodiment, Figure 3D, the recessed portion of the support body is shaped as an irregular hexagon, which is deemed to represent Applicants claimed partly-octagonal shape, given that Applicants' disclosed shaped has is also an irregular hexagon. Providing a hexagonal face of a cantilever support would have been obvious to one of ordinary skill in the art because Matsuyama teach use of a hexagonal support having all the same advantages of a conventionally shaped cantilever support.

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7. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,245,863 (Kajimura et al.) in view of "Small Cantilevers for Force Spectroscopy of Single Molecules" (Viani et al.) as applied to claim 10 above, and further in view of US 6,365,895 (Yamamoto).

With respect to the limitations of claim 19, Kajimura et al. in view of Viani et al. disclose all of the limitations of the base claim, but fail to disclose that the cantilever comprises a step-like portion which is arranged near the end of the cantilever which is attached to the support, the step-like portion substantially increasing a thickness of the cantilever on a front side of the cantilever. Kajimura et al. appears to show a thickening of the cantilever on the back side of the cantilever near the end of the cantilever which is attached to the support.

Yamamoto discloses an apparatus for measuring a micro surface configuration utilizing a cantilevered probe (1). The probe is formed of a single material and comprises a pointed tip section (1a), a beam portion (1b), and a proximal portion (1c) that is mounted to a support table (4). As shown in the figures, the proximal portion (1c) of the cantilevered probe (1) has a thickness that is substantially greater than the thickness of the beam portion (1b). Providing a cantilevered probe with a proximal portion having a substantially greater thickness than a beam portion would have been obvious to one of ordinary skill in the art as a means of making the attachment of the probe to the support structure easier.

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8. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,245,863 (Kajimura et al.) in view of "Small Cantilevers for Force Spectroscopy of Single Molecules" (Viani et al.) as applied to claim 10 above, and further in view of US 5,717,132 (Watanabe et al.).

With respect to the limitations of claim 19, Kajimura et al. in view of Viani et al. disclose all of the limitations of the base claim, but fail to disclose that the cantilever comprises a step-like portion which is arranged near the end of the cantilever which is attached to the support, the step-like portion substantially increasing a thickness of the cantilever on a front side of the cantilever. Kajimura et al. appears to show a thickening of the cantilever on the back side of the cantilever near the end of the cantilever which is attached to the support.

Watanabe et al. disclose a cantilever assembly (Figure 10), comprising: a cantilever (CA1) having a cantilever tip (3P), the cantilever having a back side (top of cantilever) and a front side (bottom side, tip side) opposite the back side and the cantilever being operably mounted to a rigid support (19) on the back side, wherein the cantilever comprises a step-like portion on its front side near where the cantilever is attached to the support, the step-like portion substantially increasing a thickness of the cantilever. Providing a cantilevered probe with a proximal portion having a substantially greater thickness than a beam portion would have been obvious to one of ordinary skill in the art as a means of making the attachment of the probe to the support structure easier.

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9. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,717,132 (Watanabe et al.) in view of US 5,245,863 (Kajimura et al.)

Watanabe et al. disclose all of the limitations of the base claim including an embodiment, as discussed with reference to Figures 56 and 57, whereby cantilever flexure is measured using the optical lever method. A piece of aluminum thin film is placed on the back side of the cantilever facing away from the sample. Watanabe et al.

Kajimura et al. disclose an area (18) of high reflectance material on the back side of the cantilever facing away from a sample. The area (18) also appears to have a boundary sloping towards the support (17). Modifying the thin aluminum film to have a sloping boundary would have been well within the purview of one of ordinary skill in the art.

Response to Arguments

10. Applicant's arguments filed 12 November 2009 have been fully considered but they are not persuasive.

With respect to Applicants' arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

The use of the Viani et al. article is to only show that silicon nitride cantilevers can be made to have a length between one and one hundred micrometers. The

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examiner took no position that the entire structure and placement of the tip and reflector as presented in Kajimura et al. was being substituted for the cantilever and associated structure described in Viani et al. As appears to argued, Applicants' attempt to try and substitute the cantilever shown in Viani et al. creates a cantilever that has its reflective portion facing the sample. The examiner is unclear as to how this would work as a means of examining a sample if the tip was pointed in the opposite direction from the sample. As to Applicants' argument regarding front side and back side, the reference to Kajimura et al. sets forth the basic structure of the cantilever assembly save for the length of the cantilever. Viani et al. is again used to only show that silicon cantilevers, the same used in Kajimura et al., may be made much smaller in length.

With respect to Applicants' argument, page 18, lines 14-17, that one of ordinary skill in the art would view the combination of Kajimura et al. in view of Viani et al. as requiring the reflective area on the front side of the cantilever, the examiner simply wonders if Applicant is stating fact or expressing opinion. Applicants have provided no reasons as to why this statement has been made; and furthermore, fails to provide any statement or opinion from one of ordinary skill in the art other than, presumably, the Applicant whose viewpoint is clearly biased. Moreover, Matsuyama et al. (US 5,319,961) while not used in this rejection certainly suggests a small cantilever (50-200 micrometers) having a tip mounted on a front side of the cantilever and a support (12) on a back side of the cantilever, whereby optical measurement displacement of the cantilever occurs, see col. 1, lines 18-25 and 43-45 and Figure 2J. Thus, one of

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ordinary skill in the art does seem to suggest that the reflective area and the support may be both located on the back side of a small cantilever.

With respect to Applicants' assertion that Kajimura et al. fails to disclose the ratio of the flat extension to the sloped boundary of the extension. page 19, lines 1-12, the examiner respectfully disagrees. While Kajimura et al. fails to expressly recite this teaching, Figure 1 clearly shows regardless of the scale used in the reference, an intent to create a sizeable reflective area having sloping boundaries, which in turn create a ratio of the flat extension (c) to the extension of the sloped boundary of this area (Δc) of greater than one. Kajimura et al. have specifically shown a reflective area having a sloping boundary rather than drawing a reflector have sharp edges. This teaching is deemed to be enough for one of ordinary skill in the art to manufacture a reflective area meeting this ratio.

Allowable Subject Matter

11. Claims 16 and 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. Claims 23-25 are allowed.

Conclusion

13. Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicants are reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL S. LARKIN whose telephone number is (571)272-2198. The examiner can normally be reached on 8:30 AM - 5:00 PM Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on 571-272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Daniel S. Larkin/
Primary Examiner, Art Unit 2856
01 March 2010